MR 52043

The Dow Chemical Company
Midland, Michigan 48674

1803 BUILDING
September 27, 2001

8EHQ-1001-14302

VIA CERTIFIED MAIL-RETURN RECEIPT REQUESTED 7000 0600 0025 5632 3858

Document Processing Center (TS-790)
Office of Toxic Substances
U.S. Environmental Protection Agency
Ariel Rios Building
1200 Pennsylvania Avenue, N.W.
Washington, D.C. 20460
Attn: 8(e) Coordinator

Re: 8EHQ-1098-14302 and Supplements
Response to Request for Additional Information

Contain NO CBI

Dear Sir/Madam:

Reference is made to your request dated August 30, 2001.

The documents identified in a letter from Richard Hefter of EPA dated August 30, 2001, and addressed to Paul Wright of The Dow Chemical Company are attached. Also included is a copy of another industrial hygiene survey from 1993 where 2,4-dichlorophenol is one of many chemicals and other exposures included. Please reference Table 10 in the report for results relevant to 2,4-dichlorophenol.

All results included in these additional documents are consistent with the information provided earlier and confirm exposures far below the internal guideline.

Documents included:

(1) "Evaluation of Worker Exposures to 2,4-Dichlorophenol During the Sampling and Unloading of Dichlorophenol Isotainers, Michigan Division, Herbicide Formulations Plant, 489 Building, June, 1994."

(2) "Evaluation of Worker Exposures to 2,4-dichlorophenol During Drum Filling Operations, Michigan Division, Herbicide formulations Plant, 489 Building, July, 1995."

(3) Death in Chemical Worker from 2,4-Dichlorophenol: Summary of Medical Data on 2,4-Dichlorophenol Human Exposures, 11-30-98.

(4) " Comprehensive Industrial Hygiene Survey of the Michigan Division Herbicide Formulation Plant, 489 Building, July 1992 and February 1993."

If you have additional questions, please direct them to the undersigned.

Sincerely,

Linda C Burgert

Linda C. Burgert
EH&S Product Regulatory Management
PH: 989-636-1011
FAX: 989-638-9933
E-MAIL: lburgert@dow.com

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Attachments (4)

INDUSTRIAL HYGIENE REPORT

THE DOW CHEMICAL COMPANY

DATE ISSUED
September 1, 1995

DEPARTMENT
INDUSTRIAL HYGIENE SERVICES

OSD	ACCOUNT NO.	PROJECT-TASK NUMBER

TITLE
EVALUATION OF WORKER EXPOSURES TO 2,4-DICHLOROPHENOL DURING DRUM FILLING OPERATIONS, MICHIGAN DIVISION, HERBICIDE FORMULATIONS PLANT, 489 BUILDING, JULY 1995

AUTHOR(S) SIGNATURE(S)
B. S. Powers — September 1, 1995

REVIEWER'S SIGNATURE(S)
R. A. Dommer — 9/11/95

DESCRIPTIVE SUMMARY WITH CONCLUSIONS

An industrial hygiene survey was conducted to evaluate worker exposures to 2,4-dichlorophenol in the Herbicide Formulations Plant, 489 Building, Michigan Division. Full shift personal monitoring for 2,4-dichlorophenol was conducted during drum filling operations on July 11 and 12, 1995. The operation is conducted at the drum filling station located outdoors in the 489 Building Tank Farm.

Personal full shift results for 2,4-dichlorophenol during drum filling operations indicated that employee airborne exposures ranged from 0.06 to 0.13 ppm. The 8-hour Time-Weighted Average (TWA) Dow Industrial Hygiene Guide for 2,4-dichlorophenol is 1 ppm. Results of area monitoring for 2,4-dichlorophenol during the drumming operations indicated the 2,4-dichlorophenol concentration at the drum filling station ranged from 0.01 to 0.1 ppm. During the drumming operations, employees wore neoprene or nitrile gloves, monogoggles, hardhat, long sleeves and safety shoes.

Current work practices for wearing personal protective equipment are adequate to minimize potential exposure to 2,4-dichlorophenol during drumming operations. Ensure that the results of this survey are communicated to employees involved with the process.

Analysis of air sampling tubes used for the collection of dichlorophenol vapors was conducted by the Health and Environmental Science's Analytical Chemistry Laboratory, 1803 Building, and reported in IHAL-95-108.

INDUSTRIAL HYGIENE REPORT

THE DOW CHEMICAL COMPANY

DATE ISSUED
July 29, 1994

DEPARTMENT	OSD	ACCOUNT NO.	PROJECT-TASK NUMBER
INDUSTRIAL HYGIENE SERVICES			

TITLE

EVALUATION OF WORKER EXPOSURES TO 2,4-DICHLOROPHENOL DURING THE SAMPLING AND UNLOADING OF OF DICHLOROPHENOL ISOTAINERS, MICHIGAN DIVISION, HERBICIDE FORMULATIONS PLANT, 489 BUILDING, JUNE, 1994.

AUTHOR(S) SIGNATURE(S)
B. S. Powers — Brian S. Powers — July 29 1994

REVIEWER'S SIGNATURE(S)
P. R. Williams — Paul R. Williams — 7/29/94

DESCRIPTIVE SUMMARY WITH CONCLUSIONS

An industrial hygiene survey was conducted to evaluate worker exposures to 2,4-dichlorophenol in the Herbicide Formulations Plant, 489 Building, Michigan Division. Short-term personal monitoring for dichlorophenol was conducted during unloading operations for two dichlorophenol tank truck isotainers on June 21, 1994. Activities which were monitored included bulk sampling for dichlorophenol, disconnection of the isotainer unloading hose, and draining of residual dichlorophenol from the isotainer into a plastic container.

Personal excursion sampling results for dichlorophenol during isotainer unloading operations indicated that employee airborne exposures ranged from 0.07 to 0.3 ppm. The 8-hour Time-Weighted Average (TWA) Dow Industrial Hygiene Guide for dichlorophenol is 1 ppm. Results of area monitoring for dichlorophenol during the unloading operations indicated the dichlorophenol concentration in the isotainer unloading station ranged from 0.01 to 0.06 ppm. During manual unloading operations, employees wore a neoprene suit, neoprene gloves, monogoggles, faceshield and hardhat.

Current work practices for wearing personal protective equipment are adequate to minimize potential exposure to dichlorophenol during isotainer unloading operations. The results of this survey should be communicated to the employees involved with the process.

Analysis of air sampling silica gel tubes used for the collection of dichlorophenol vapors was conducted by the Health and Environmental Science's Analytical Chemistry Laboratory, 1803 Building and reported in IHAL-94-109.

11-30-98
Death in Chemical Worker from 2,4-Dichlorophenol:
Summary of Medical data on 2,4-dichlorophenol human exposures
Paul J. Brownson, M.D., 308/LL-E1(Indy), 317-337-3247, fax 317-337-4339

1. Review of medical records of 28 cases of 2,4-dichlorophenol exposure in Midland between 1983 and 1991 disclosed primarily first and second degree skin burns, varying from minor 1-2 cm areas which healed within several days to 10X32cm Forearm or 12X25cm both lower legs which healed in 2.5 weeks to 2.5 months. Typically the burns were less severe if exposure was limited to small area at ambient temperature and with rapid showering (within 1 minute); the burns were more severe and slower to heal with larger area exposure at elevated temperatures (molten, with steam condensate etc.) despite rapid showering (within 30-60 seconds). Nearly all cases were showered within 1 minute; the exceptions in this group involved minor exposures which were not immediately apparent (leak around gloves etc.)
2. Review of deaths attributed to 2,4-DCP exposure: case 1(known)—October 1998 in Midland, due to burns to face, one knee and thigh, both forearms, with collapse during delayed showering approximately 20 minutes after exposure; exposure was confirmed by blood levels(free DCP 7.2 micrograms/ml, total DCP 13.1micrograms/ml); cases 2&3 (suspected)—the first was 8-16-48 in Midland, due to burns to both lower legs; the second was 9-16-80 in Midland, due to burns to face, neck, back, thighs. The exposure circumstances of case 3 was similar to case 1, involving apparent line opening resulting in exposure to molten 2,4-DCP without proper protective equipment, and with failure to use the nearby safety shower and with subsequent collapse followed by cardiac arrest in the locker room shower. An additional case (4) has been reported 4-16-85 by Vertac Chemical Company, Jacksonville AK, in which a 33yr old male apparently suffered dermal exposure to 2,4-DCP (as well as possibly some monochloroacetic acid), and bypassed the nearby safety shower because it was too cold and collapsed in the locker room shower where he was observed to be unconscious and convulsing, and could not be revived. Another case(5) was reported by Kintz et al, 1992 (Arch Toxicol.66:298-299), in which a 33yr male employee was splattered over thigh and arm with pure solution of 2,4-DCP; he walked away from the scene and washed himself without undressing. He walked for a few moments in the factory and shortly thereafter (within 20 minutes) experienced a seizure and collapsed, and could not be revived. Less than 10% of body surface area was exposed. In this case blood 2,4-DCP was 24.3 mg/liter. For comparison, lethal human blood phenol concentrations reported in the literature are as follows: 56 and 27 mg/l (Soares 1982), 4.7 mg/l (Lewin 1982), and 130mg/l (Lo Dico 1989).

INDUSTRIAL HYGIENE REPORT OFFICE COPY

THE DOW CHEMICAL COMPANY

OFFICE COPY

DATE ISSUED
August 5, 1993

CSU	ACCOUNT NO.	PROJECT-TASK NUMBER

DEPARTMENT
Industrial Hygiene Research & Technology, Midland

TITLE

COMPREHENSIVE INDUSTRIAL HYGIENE SURVEY OF THE MICHIGAN DIVISION HERBICIDE FORMULATION PLANT, 489 BUILDING, JULY 1992 AND FEBRUARY 1993.

AUTHOR(S) SIGNATURE(S)
M. J. Sczepanski (088750) Matt J. Sczepanski 8-4-93 D. N. James (244746) Dan James 8/5/93

REVIEWER'S SIGNATURE(S)
W. E. Ledford (069998) William E. Ledford 8/4/93 R. M. Hahne (080665) Rolf M.G. Hahne 8/5/

DESCRIPTIVE SUMMARY WITH CONCLUSIONS

A comprehensive industrial hygiene survey was conducted at the Michigan Division Herbicide Formulation Plant between July 1992 and February 1993 to evaluate and document employees' exposures to chemical and physical agents during production and packaging of GARLON, LONTREL, TORDON and Methylchorophenoxy herbicides. Air monitoirng was conducted for the following chemicals: acetone, ammonia, 2,4-dichlorophenoxyacetic acid (2,4-D), 2,4-dichlorophenol (2,4-DCP), diatomaceous earth, dimethylamine (DMA), methylchlorophenoxypropionic acid (MCPP), DOWANOL EB, 2-ethylhexanol, isopropyi alcohol, kerosene, picloram, Polyfon H, trichlopyr-BEE, trichlopyr-TEA, and VERSENE.

The comprhenensive survey was based on the protocol issued under HEH 2.1-1-53(3). The following areas in the plant were included: 300, 500, 700, 800, the warehouse packaging , and the quaility control laboratory. External to the plant, the Tank Farm employee TWA and STEL monitoring was also conducted during rail car unloading and routine maintenance activities. All results were generally below the ACGIH recommended guidelines.

In addtion to air montoiring, this compehensive survey include a noise survey and ventilation evaluation. The comprehensive noise survey completed in 1991 recommended noise controls for a piece of equipment located in the Warehouse; therfore, noise exposures were re-evaluated. A chemical fume hood survey was also conducted in the Quality Control Laboratory.

Future monitoring should be considered during turnaround activities in the 300 and 500 Area and process changes such as drumming of molten dichlorophenol. Chemicals for consideration should include dimethylamine, isopropyl amine, n-butyl alcohol, 2-ethylhexanol and DOWANOL EB. Recommendations were offered to conduct a specific industrial hygiene survey for new operations and infrequent operations such as the DCP drum packaging and the ICP formulations in the 300 area. As a reminder, industrial hygiene should be consulted when production requires process changes or additions.

The use of respirators for certain solids dumping tasks and the use of hearing protection for personnel performing tasks exceeding 90 decibels should be emphasized. Several recommendations were made for increasing capture efficency of the chemcial fume hoods in the Quality Control Laboratory.

SUMMARY

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TABLE 10. RESULTS OF EMPLOYEE EXCURSION MONITORING FOR 2,4-DICHLOROPHENOL (2,4-DCP), AT THE MICHIGAN DIVISION HERBICIDE FORMULATION PLANT, 489 BUILDING, JANUARY THROUGH FEBRUARY 1993.

EXCURSION RESULTS

Job Activity	Job Class/ Master Number	Sample Duration (minutes)	Sample Date	2,4-DCP Conc. (ppm)
Replacement of a DCP valve in the Tank Farm	Pipe Fitter/063392	135	1-27-93	0.03

Exposure Criteria

ACGIH TLV-TWA	1 ppm
Excursion (3 times the ACGIH TLV-TWA)	3 ppm*

* - Excursion guide based on the 1992-1993 ACGIH judgmental excursion factor of three times the 8-hour TWA.

TLV- Threshold Limit Value

TWA- Time-Weighted Average